

between which are not at all intimate; in other words, notwithstanding the similarity in their habits, they must have been derived independently from different, probably terrestrial, mammalian ancestors, which themselves were not intimately related. The Pinnipedia include the Seals, Sea-Lions, and Walruses, animals closely allied to the Bears, Dogs, and Cats. The Cetacea include the Whales, Dolphins, and Porpoises, which are so much modified that their correct affinities are still matters of doubt.

There is, however, still another aquatic mammalian group or order which at the present time includes among its members only two well-marked forms or genera; these being the Dugong and the Manatee. The order is that of the Sirenia, and its members differ in their organisation considerably from both the Seals and the Whales, more nearly approaching the latter, and appearing to be most nearly allied to the Ungulate Herbivora.

The Manatees—of which there are two well-defined species, one found in and at the mouths of the rivers discharging themselves on the eastern coast of intertropical America, and the other on the opposite side of the Atlantic Ocean, on the shores of Western and Southern Africa—are large-sized somewhat seal-like herbivorous animals, sometimes reaching 17 feet in length, differing from the Seals and resembling the Whales in not having any indications of hinder extremities, at the same time that the caudal portion of the body is expanded into a horizontally-flattened tail. In them the contour of the face is peculiar, the whiskered snout being much flattened, like a pointed cone with a considerable portion of the end cut off transversely. The large nostrils are situated within a short distance of one another, at the upper portion of the truncate edge; they are closed by valves during the time that the animal is submerged. The eyes are peculiarly small and inconspicuous. The external ears are wanting. The mouth is small, without front teeth, and is placed low down, the gape being close to the anterior end of the animal. The neck, from its extreme shortness, can scarcely be said to exist as such.

Neglecting the tail, the body, which is very sparsely covered with hair, has the shape of a much elongate barrel, slightly flattened above and below. The skin is very like that of the Hippopotamus. Far forward, just behind the head, the two fore-limbs project laterally from below. The elbow is conspicuous, though placed not far from the side, and the fore-arm together with the hand, form a flat oval flapper devoid of any indications of fingers, except that at the extreme edge rudimentary nails are developed. These arms are used by the animal as claspers, which can be flexed over the chest; employed as locomotor organs at the bottom of the water, or made to assist in the prehension of food. In the female the mammae are pectoral, and the consequent general configuration has probably led to the fabulous descriptions of the existence of "mermaids."

In shape the tail is unlike that of any other animal, being spatulate. It most resembles that of the Beaver, but is a direct continuation backwards of the body, and is covered with an unmodified skin. As in the Whales and Beavers, the vertebral column forms a bony axis of support for the flattened muscular and fibrous expansion covered with thick cuticle, which forms the propelling mechanism.

The skeleton is of an extremely dense texture and very massive; the skull and ribs more resembling ivory than bone. In the number of the vertebrae which form the neck there is also a peculiarity, not shared even by its ally, the Dugong. In all mammalia there are seven cervical vertebrae, the same in the Giraffe as in the Elephant, in the Kangaroo as in Man. In the Manatee there are, however, only six, as in one other mammal only, namely, Hoffmann's Sloth. The ribs, as well as being very dense, are broader than is usually the case. As in the

Whales there are no bony traces of hind limbs, a rudimentary pelvis being alone found.

As far as the soft parts are concerned, it may be mentioned that the apex of the heart is deeply cleft, more so than in the Elephant and the Seals. This is the case also in the Dugong. The arteries in many parts break up into innumerable minute branches before they become distributed, to form the so-called *retia mirabilia*. The lungs run a considerable distance along the back of the animal, nearly reaching the root of the tail, instead of being entirely included in the thoracic region.

The half-grown female Manatee which has just reached the Zoological Society's Gardens, is the first living specimen which has been seen in this country. It came from the coast of Demerara, and was three weeks on the journey, during which time it was in a big swinging tank constructed to hold it. Two previous unsuccessful attempts were made in 1866 to forward living specimens to Regent's Park; in one case the animal did not die till within two days of its reaching Southampton. The valuable memoir by Dr. Murie in the eighth volume of the Society's *Transactions* was based on the dissection of these two specimens, which were preserved immediately they died in a condition fit for minute investigation.

The living animal appears to be in a good state of health, its movements are much less active than those of the Seals, and as food it takes vegetable marrow and lettuce in preference to anything else.

A third member of the order Sirenia was the *Rhytina*, a toothless animal, sometimes reaching 24 feet in length, discovered by Steller during Behring's expedition in 1741 on the shores of the island which bears his name. The slaughter of these creatures for their flesh was so recklessly conducted that they had all disappeared in 1789, and have never been seen since. There are three skeletons of this extinct species (*Rhytina stelleri*) in existence, all in Russia.

THE WÖHLER FESTIVAL

THE 31st of July was a festive day for Chemical Germany, and for the numerous admirers of the celebrated senior of German chemistry, Prof. Wöhler of Göttingen; not only as the seventy-fifth anniversary of his birth, but also as the supposed fiftieth anniversary of his entering upon his professional duties. In 1825 Dr. Wöhler became teacher of chemistry to the Berlin "Gewerbeschule;" in 1831 he exchanged this position for a similar one in Cassel, and from 1836 up to the present day he has been forming generations of chemists who flocked to Göttingen attracted by his fame. We need not remind our readers of the numerous discoveries of this great and genial man, of which the artificial formation of urea, the production of aluminium, his researches on cyanic and cyanuric acids, on boron and silicon, his joint researches with Liebig on uric acid and benzoyl-compounds, and many others, are known to all chemists, and have opened new roads to science.

From eight o'clock in the morning until noon of the above-mentioned day, one deputation relieved another to express their thanks and congratulations. The Faculty of Science of Tübingen sent a diploma of Doctor of Science, so that similar to the triple crown of the Head of the Roman Church, three doctor's degrees, that of Medicine, of Philosophy, and of Science are now worn by the Head of German Chemistry. The German Chemical Society at Berlin was represented by three members of its council, two of this deputation being pupils of Dr. Wöhler. They presented an appropriate address in a handsome cover of malachite, an allusion to the services rendered by the great chemist to the allied science of mineralogy. In the evening many of the undergraduates of the University (now eleven hundred in number) expressed their admiration in the time-honoured shape of a torch procession.

The following day found Prof. Wöhler unbent by the honorary burden of the 31st of July, and some privileged friends and pupils had the pleasure of seeing him working at the analysis of a new mineral with the same zeal he would have shown fifty years ago. This formed the most pleasant part of the Wöhler Festival, being a hopeful sign of the vigour and power left to this great man. The readers of NATURE (vol. xii. p. 179) were able, only a few weeks ago, by the perusal of extracts from charming recollections of Prof. Wöhler's youth, to witness a similar proof. In fact, his youth has accompanied him into his old age.

A. OPPENHEIM

THE GIGANTIC LAND TORTOISES OF THE MASCARENE AND GALAPAGOS ISLANDS*

III.

I WILL now indicate the characteristics of the different races which I have been able to recognise in the materials to which I have had access.

It has been mentioned above that the principal mark of distinction is in the form of the skull: some species having a depressed skull with the surface flat above, whilst in others it is much higher and convex above. Hand-in-hand with this difference in the skull goes another in the pelvis; the flat-headed Tortoises having a broad, horizontally dilated bridge between the obturator foramina, whilst in the round-headed form the bridge is vertically compressed. Such a distinction might have been expected between the Galapagos Tortoises on the one hand, and the Mascarene races on the other; but what justly excites our surprise is that the Galapagos Tortoises and the extinct forms of the Mascarenes belong to the same (the flat-headed) type and that, therefore, a much greater affinity exists between them, than between the extinct and living races of the Mascarenes.

I.—FLAT-HEADED TYPE

A. The *Galapagos Tortoises* may be recognised by the invariable absence of a nuchal plate, by the convergence of the posterior margins of the two gular plates which never form a straight line, by the black colour of the shell, by a large scute of the inner side of the elbow, by the double alveolar ridge of their jaws. Among the carapaces which I have examined I can distinguish five forms; of the first four severally two are more nearly related to each other than to the other pair, the fifth being intermediate between these two pairs. The degree of distinctness and affinity which obtains in the carapaces is expressed clearly and in exactly the same manner in the skulls, as will be seen from the following characteristics:—

1. In the first species (*Testudo elephantopus* of Harlan) the shell is broad and depressed, with the upper anterior profile sub-horizontal in the male, and with corrugated but not deeply sculptured plates. Sternum truncated behind. The snout is very short. Skull with an immensely developed and raised occipital crest, with a sharp outer pterygoid edge, and a deep recess in front of the occipital condyle. The skeleton of a fully adult male example and one of an immature female are in the Oxford Museum and the collection of the Royal College of Surgeons. Young individuals are by no means scarce in collections. Either this species or the next appears to have inhabited James' Island.

2. *Testudo nigrita* has likewise a broad shell which, however, is considerably higher than in the former species; the anterior profile in the male is declivous, and the plates are deeply sculptured. Sternum with a tri-

angular excision behind. The snout is longer and the occipital crest low; but the outer pterygoid edge is equally sharp, and the recess in front of the occipital condyle equally deep as in *T. elephantopus*. The principal specimens examined by myself of this species, are one 41 inches long, in the British Museum; the type of the species (described and named by Dumeril and Borbron) in the collection of the Royal College of Surgeons; and the large skull in the British Museum, figured by Dr. Gray under the name of *Testudo planiceps*.

3. Porter's account of the race inhabiting Charles Island is sufficiently characteristic to enable us to recognise it in an adult specimen, the shell of which is elongate, compressed into the form of a Spanish saddle, and of a dull colour without any polish. The sternum is truncated behind. Skull with the outer pterygoid edge flattened, with the tympanic cavity much produced backwards, and without recess in front of the occipital condyle. The only adult example which I have examined is 33 inches long, and belongs to the Museum of Science and Arts, Edinburgh. It was lent to me by the Director, Mr. T. C. Archer, who most kindly allowed the skull and limb-bones to be extracted, which could be effected without the least injury to the outward appearance of the specimen. This species I have named *Testudo ephippium*.

4. The smallest of the Galapagos Tortoises is one for which I have proposed the name *Testudo microphyes*, the carapace of a fully adult male being only 22½ inches long. We may presume that this specimen, for an examination of which I am indebted to the Museum Committee of the Royal Institution of Liverpool, is a representative of the race from Hood's Island, Porter having expressly stated that the tortoises of that island are small, and similar to those of Charles Island. Indeed, the shell is elongate as in *T. ephippium*, but the anterior profile is declivous. The skull has the characteristics of a young skull of one of its more gigantic congeners; the outer pterygoid edge is flat, and there is no recess in front of the occipital condyle, as in the species from Charles Island.

5. In the last species (*Testudo vicina*) the skull is depressed as in the first, with the upper exterior profile sub-horizontal in the male, and with the lateral anterior margins reverted so as to approach the peculiar shape of *T. ephippium*. The concentric sculpture of the plates is distinct. Sternum of quite a peculiar shape, much constricted and produced in front, and expanded and excised behind. The skull is extremely similar to that of *T. ephippium*. Unfortunately nothing is known of the history of the adult male example which formerly was in the possession of Prof. Huxley and ceded by him to the collection of the British Museum.

B. The *Mauritian Tortoises*.—It would be a matter of considerable interest to ascertain whether the tortoises of Mauritius lacked the nuchal plate, like the Galapagos races to which in other respects they are so closely related. The only carapace which I have seen is deprived of the epidermoid scutes, and, besides, so much injured in the nuchal region that it is impossible to determine the absence or presence of a nuchal plate. But the Mauritian tortoises were characterised by a peculiarity hitherto unknown among recent land tortoises, viz., by a treble serrated dental ridge along the lower jaw.

The examination of a considerable number of bones, part of which were obtained during the search for Dodo-bones, and are now in the British Museum, whilst for others from the district of Flacq I am indebted to M. Bouton, has convinced me of a multiplicity of species in this island. The majority of the bones were found near Mahebourg, in a ravine of no great depth or steepness, which apparently once conveyed to the sea the drainings of a considerable extent of circumjacent land, but which has been stopped to seaward most likely for ages by an accumulation of land. The outlet from this ravine having

* The substance of this article is contained in a paper read by the author before the Royal Society in June, 1847, and will appear in the forthcoming volume of the "Philosophical Transactions," and to which I must refer for the scientific portion and other details. Some facts which have come to my knowledge subsequently to the reading of this paper, are added. Continued from p. 265.